IN THE CLAIMS

Please substitute the following listing of claims for the previous listing of claims.

1. (Currently amended) A method of processing a substrate, the method comprising:

providing a substrate in a process chamber, the substrate having a surface;

introducing a gas into the process chamber;

energizing the gas by applying an RF current through a multi-turn antenna above an external surface of a wall of the process chamber to pass ~~passing~~ RF energy through a the external surface of the wall of the process chamber ~~at a power sufficient~~ to couple the RF energy ~~from above an external surface of the process chamber~~ to the gas inside the process chamber to energize the gas; ~~and~~

detecting radiation from directly above the surface of the substrate after the radiation propagates through the wall and the external surface of the process chamber; and

evaluating the detected radiation to monitor the depth of a layer being processed on the substrate.

2. (Currently amended) A method according to claim 1 comprising energizing the gas by powering ~~an~~ a multi-turn antenna comprising a coil that spirals radially inward ~~external to the process chamber at the power~~.

3. (Currently amended) A method according to claim 2 wherein the multi-turn antenna (1) covers a portion of a ceiling of the process chamber, (2) is non-vertical, or (3) comprises a coil.

4. (Previously presented) A method according to claim 2 wherein the antenna covers a portion of a ceiling of the process chamber, and wherein the ceiling (1) is at least partially dome shaped, (2) comprises a ceramic, or (3) comprises a portion that is permeable to RF energy.

5. (Previously presented) A method according to claim 1 wherein the radiation propagating through the wall comprises an optical beam.

6. (Previously presented) A method according to claim 1 wherein the wall comprises a window that (1) faces the substrate, (2) is permeable to X-rays, (3) is permeable to an optical beam, (4) comprises one or more of silica, sapphire or quartz, (5) is removable from the wall, or (6) is permanently affixed about an opening in the wall.

7. (Original) A method according to claim 1 comprising monitoring radiation propagating through the wall with a process monitoring assembly, and wherein the process monitoring assembly (1) is housed in an enclosure above the wall, (2) is adapted to be mounted above a window in the wall, (3) is mounted to allow line-of-sight view of the substrate in the process chamber, (4) is responsive to radiation, or (5) comprises an interferometer.

8. (Original) A method according to claim 1 comprising monitoring radiation propagating through the wall with a process monitoring assembly comprising a signal source, a signal detector, a collimating assembly and a radiation transmission cable connecting the collimating assembly to the signal source and signal detector, the radiation transmission cable having a bifurcated end.

9. (Original) A method according to claim 8 comprising connecting a first branch of the bifurcated end to the signal source and a second branch of the bifurcated end to the signal detector.

10. (Currently amended) A method of processing a substrate, the method comprising:

placing a substrate in a process chamber, the substrate having a surface;

introducing a gas into the process chamber;

applying an RF current through a multi-turn antenna above an external surface of a portion of a ceiling of the process chamber facing the substrate to inductively couple ~~coupling~~ RF energy through ~~a~~ the portion of the ceiling of the process chamber ~~facing the substrate at a power sufficient to couple the RF energy from above an external surface of the portion of the ceiling facing the substrate~~ to the gas inside the process chamber to energize the gas; ~~and~~

detecting radiation from directly above the surface of the substrate after the radiation propagates through a window in the portion of the ceiling facing the substrate ~~and the external surface of the process chamber~~; and

evaluating the detected radiation to monitor the depth of a layer being processed on the substrate.

11. (Canceled.)

12. (Currently amended) A method according to claim 10 comprising inductively coupling the RF energy by powering ~~an~~ a multi-turn antenna that (1) is non-vertical[[,]] or (2) comprises a coil.

13. (Previously presented) A method according to claim 10 wherein the portion of the ceiling substantially facing the substrate (1) is at least partially dome shaped, (2) comprises a ceramic, or (3) comprises a portion that is permeable to RF energy.

14. (Previously presented) A method according to claim 10 comprising monitoring radiation comprising an optical beam propagating through the window.

15. (Previously presented) A method according to claim 10 wherein the window (1) faces the substrate, (2) is permeable to X-rays, (3) is permeable to an optical beam, (4) comprises one or more of silica, sapphire or quartz, (5) is removable from the wall, or (6) is permanently affixed about an opening in the wall.

16. (Previously presented) A method according to claim 10 comprising detecting radiation with a process monitoring assembly, wherein the process monitoring assembly (1) is housed in an enclosure above the portion of the ceiling facing the substrate, (2) is adapted to be mounted above the window, (3) is mounted to allow line-of-sight view of the substrate in the process chamber, (4) is responsive to radiation, or (5) comprises an interferometer.

17. (Currently amended) A method of processing a substrate, the method comprising:

providing a chamber having a wall, the wall comprising an external surface that is at least partially dome shaped;

providing a substrate in the chamber, the substrate having a surface;

introducing a gas into the chamber;

inductively coupling RF energy <u>to the gas in the chamber</u> ~~at a power sufficient to pass~~ <u>by passing</u> the RF energy from above the at least partially domed external surface to the gas inside the chamber; ~~and~~

monitoring radiation from directly above a surface of the substrate that propagates through the at least partially domed external surface during processing of the substrate<u>; and</u>

<u>evaluating the monitored radiation to monitor the depth of a layer being processed on the substrate</u>.

18. (Previously presented) A method according to claim 17 comprising monitoring radiation that propagates through a window in the wall.

19. (Previously presented) A method according to claim 17 comprising powering an antenna covering a portion of the wall of the chamber to couple energy to process gas in the chamber.

20. (Previously presented) A method according to claim 17 comprising monitoring radiation comprising an optical beam propagating through the window.

21. (Currently amended) A method of processing a substrate, the method comprising:

placing a substrate in a first enclosure, the substrate having a surface;

introducing a process gas into the first enclosure;

~~powering an~~ applying an RF current through a multi-turn antenna to ~~inductively couple RF energy at a power sufficient to~~ pass RF energy from outside an external surface of a portion of the ceiling of the first enclosure facing the substrate to the process gas inside the first enclosure to energize the process gas; and

monitoring ~~a sufficient intensity of~~ radiation from directly above the surface of the substrate from after the radiation has propagated through the portion of the ceiling and external surface of the first enclosure facing the substrate and into a second enclosure disposed above the first enclosure to monitor the depth of a layer being processed on the substrate to determine a process endpoint.

22. (Currently amended) A method according to claim 21 wherein the multi-turn antenna is within the second enclosure.

23. (Canceled.)

24. (Previously presented) A method according to claim 21 comprising monitoring radiation with a process monitoring assembly at least partially within the second enclosure, the process monitoring system comprising a signal source, a signal detector, a collimating assembly and a radiation transmission cable connecting the collimating assembly to the signal source and signal detector, the radiation transmission cable having a bifurcated end.

25. (Original) A method according to claim 24 comprising connecting a first branch of the bifurcated end to the signal source and a second branch of the bifurcated end to the signal detector.

26-32. (Canceled)

33. (Currently amended) A method of processing a substrate in a process chamber having a wall and a non-vertical <u>multi-turn</u> antenna about the wall, the method comprising:

placing a substrate in the process chamber;

introducing a gas into the process chamber;

powering the non-vertical <u>multi-turn</u> antenna ~~that is~~ to couple energy through the wall to the gas inside the process chamber to energize the gas; ~~and~~

detecting radiation propagating through the wall<u>; and</u>

<u>evaluating the detected radiation to monitor the depth of a layer being processed on the substrate</u>.

34. (Currently amended) A method according to claim 33 comprising powering a non-vertical <u>multi-turn</u> antenna <u>comprising</u> ~~that is~~ a coil <u>that spirals radially inward</u>.

35. (Previously presented) A method according to claim 33 comprising detecting radiation propagating through a wall comprising a ceramic.

36. (Previously presented) A method according to claim 35 wherein the ceramic comprises alumina or silica.

37. (Previously presented) A method according to claim 33 comprising detecting radiation comprising an optical beam.

38. (Currently amended) A method of processing a substrate in a chamber having an external top surface, and ~~an~~ <u>a multi-turn</u> antenna covering at least a portion of the external top surface, the method comprising:

providing a substrate in the chamber:

introducing a gas into the chamber;

coupling energy across the substantial portion of the external top surface to the gas in the chamber by powering the <u>multi-turn</u> antenna; ~~and~~

monitoring radiation that propagates through the portion of the external top surface<u>; and</u>

<u>evaluating the monitored radiation to monitor the depth of a layer being processed on the substrate</u>.

39. (Currently amended) A method according to claim 38 comprising powering ~~an~~ <u>a multi-turn</u> antenna that is <u>(1)</u> non-vertical<u> or (2) a coil</u>.

40. (Previously presented) A method according to claim 38 comprising detecting radiation comprising an optical beam.

41. (Currently amended) A method of processing a substrate in a chamber comprising a flat wall facing the substrate and ~~an~~ a multi-turn antenna at least partially covering the flat wall[[;]], the method comprising:

providing a substrate in the chamber:

introducing a gas into the chamber;

coupling energy across the wall to the gas in the chamber by powering the multi-turn antenna; ~~and~~

detecting radiation that propagates through the flat wall; and

evaluating the detected radiation to monitor the depth of a layer being processed on the substrate.

42. (Currently amended) A method according to claim 41 comprising powering ~~an~~ a multi-turn antenna that is a coil.

43. (Previously presented) A method according to claim 41 comprising detecting radiation comprising an optical beam.

44. (Currently amended) A method of processing a substrate in a chamber comprising a wall facing the substrate, the wall being at least partially covered by an antenna, a cathode within the chamber, and an RF power source, the method comprising:

providing a substrate in the chamber:

introducing a gas into the chamber;

applying an RF signal to the cathode and antenna by powering the RF power source ~~to produce electric fields within the chamber that interact with the gas~~ to form a plasma in the chamber; ~~and~~

detecting radiation that propagates through the wall; and

evaluating the detected radiation to monitor the depth of a layer being processed on the substrate.

45. (Previously presented) A method according to claim 44 comprising detecting radiation comprising an optical beam.

46-55. (Canceled)

56. (New) A method according to claim 1 comprising applying an RF current through a multi-turn antenna comprising a coil having separate turns, each turn having a different radius.

57. (New) A method according to claim 1 wherein the process chamber is an etching chamber.

58. (New) A method according to claim 7 wherein the process monitoring assembly is abutting the external surface of the wall of the process chamber.

59. (New) A method according to claim 10 comprising applying an RF current through a multi-turn antenna comprising a coil that spirals radially inward.

60. (New) A method according to claim 10 comprising applying an RF current through a multi-turn antenna comprising a coil having separate turns, each turn having a different radius.

61. (New) A method according to claim 10 wherein the process chamber is an etching chamber.

62. (New) A method according to claim 16 wherein the process monitoring assembly is abutting the external surface of the portion of the ceiling of the process chamber.

63. (New) A method according to claim 17 comprising powering an multi-turn antenna comprising a coil that spirals radially inward.

64. (New) A method according to claim 17 comprising applying an RF current through a multi-turn antenna comprising a coil having separate turns, each turn having a different radius.

65. (New) A method according to claim 17 wherein the chamber is an etching chamber.

66. (New) A method according to claim 17 comprising monitoring radiation with a process monitoring assembly that is abutting the external surface of the wall that is at least partially dome shaped.

67. (New) A method according to claim 21 comprising applying an RF current through a multi-turn antenna comprising a coil that spirals radially inward.

68. (New) A method according to claim 21 comprising applying an RF current through a multi-turn antenna comprising a coil having separate turns, each turn having a different radius.

69. (New) A method according to claim 21 wherein the first enclosure is an etching chamber.

70. (New) A method according to claim 21 comprising monitoring radiation with a process monitoring assembly that is abutting the external surface of the portion of the ceiling of the first enclosure.

71. (New) A method according to claim 33 comprising powering a non-vertical multi-turn antenna comprising a coil that spirals radially inward.

72. (New) A method according to claim 33 comprising powering a non-vertical multi-turn antenna comprising a coil having separate turns, each turn having a different radius.

73. (New) A method according to claim 33 wherein the process chamber is an etching chamber.

74. (New) A method according to claim 33 comprising detecting radiation with a process monitoring assembly that is abutting the external surface of the portion of the wall of the process chamber.

75. (New) A method according to claim 38 comprising powering a multi-turn antenna comprising a coil that spirals radially inward.

76. (New) A method according to claim 38 comprising powering a multi-turn antenna comprises a coil having separate turns, each turn having a different radius.

77. (New) A method according to claim 38 wherein the chamber is an etching chamber.

78. (New) A method according to claim 38 comprising monitoring radiation with a process monitoring assembly that is abutting the external top surface of chamber.

79. (New) A method according to claim 41 comprising powering a multi-turn antenna comprising a coil that spirals radially inward.

80. (New) A method according to claim 41 comprising powering a multi-turn antenna comprises a coil having separate turns, each turn having a different radius.

81. (New) A method according to claim 41 wherein the chamber is an etching chamber.

82. (New) A method according to claim 41 comprising detecting radiation with a process monitoring assembly that is abutting the flat wall.

83. (New) A method according to claim 44 comprising applying an RF signal to a multi-turn antenna comprising a coil that spirals radially inward.

84. (New) A method according to claim 44 comprising applying an RF signal to a multi-turn antenna comprises a coil having separate turns, each turn having a different radius.

85. (New) A method according to claim 44 wherein the chamber is an etching chamber.

86. (New) A method according to claim 44 comprising detecting radiation with a process monitoring assembly that is abutting the wall facing the substrate.

87. (New) A method of processing a substrate, the method comprising:

providing a substrate in a process chamber, the substrate having a surface;

introducing a gas into the process chamber;

energizing the gas by applying an RF current through an antenna from above an external surface of a wall of the process chamber to couple RF energy through the wall of the process chamber to the gas inside the process chamber to energize the gas;

detecting radiation from directly above the surface of the substrate after the radiation propagates through the wall of the process chamber via a process monitoring assembly abutting the external surface of the wall of the chamber; and

evaluating the detected radiation to monitor the depth of a layer being processed on the substrate.

88. (New) A method of processing a substrate in an etching chamber having a wall and a non-vertical antenna about the wall, the method comprising:

placing a substrate in the etching chamber;

introducing a gas into the etching chamber;

powering the non-vertical antenna to couple energy through the wall to the gas inside the etching chamber to energize the gas;

detecting radiation propagating through the wall; and

evaluating the detected radiation to monitor the depth of a layer being processed on the substrate.

89. (New) A method of processing a substrate in a chamber comprising a wall facing the substrate, the wall being at least partially covered by an antenna, a cathode within the chamber, and an RF power source, the method comprising:

providing a substrate in the chamber:

introducing a gas into the chamber;

applying an RF signal to the cathode and antenna by powering the RF power source to form a plasma in the chamber;

detecting radiation that propagates through the wall using a monitoring assembly abutting an external top surface of the wall of the chamber; and

evaluating the detected radiation to monitor the depth of a layer being processed on the substrate.